What Is Claimed Is:

1. A method of time domain transmission, comprising the steps of:
   (a) producing a sinusoidal signal;
   (b) producing a train of pulses;
   (c) multiplying said sinusoidal signal by said train of pulses to produce a train of sinusoidal bursts;
   (d) transmitting said train of sinusoidal bursts.

2. The method of claim 1, wherein step (b) comprises producing said train of pulses using an information signal.

3. The method of claim 2, wherein step (b) further comprises time positioning each pulse of said train of pulses using said information signal, thereby causing each sinusoidal burst in said train of sinusoidal bursts that is produced in step (c) to be time positioned based on said information signal.

4. The method of claim 3, wherein said each pulse in said train of pulses has a substantially Gaussian shape, thereby causing each sinusoidal burst in said train of sinusoidal bursts to have a substantially Gaussian shape.

5. The method of claim 1, wherein step (b) further comprises producing said train of pulses using an information signal and a coding signal.

6. The method of claim 5, wherein step (b) further comprises time positioning each pulse of said train of pulses using said information signal and said coding signal, thereby causing each sinusoidal burst in said train of

sinusoidal bursts that is produced in step (c) to be time positioned based on said information signal and said coding signal.

7. The method of claim 6, wherein said coding signal comprises a pseudo random code.

8. The method of claim 7, wherein said each pulse in said train of pulses has a substantially Gaussian shape, thereby causing said each sinusoidal burst of said train of sinusoidal bursts to have a substantially Gaussian shape.

9. The method of claim 1, wherein step (a) further comprises adjusting a phase of said sinusoidal signal based on an information signal, thereby causing each sinusoidal burst in said train of sinusoidal bursts that is produced in step (c) to be phase modulated based on said information signal.

10. The method of claim 9, wherein said each pulse in said train of pulses has a substantially Gaussian shape, thereby causing each said sinusoidal burst in said train of sinusoidal bursts to have a substantially Gaussian shape.

11. The method of claim 1, wherein step (a) further comprises adjusting a phase of said sinusoidal signal based on an information signal and a coding signal, thereby causing each sinusoidal burst in said train of sinusoidal bursts that is produced in step (c) to be phase modulated based on said information signal and said coding signal.

12. The method of claim 11, wherein said each pulse in said train of pulses has a substantially Gaussian shape, thereby causing said each sinusoidal burst in said train of sinusoidal bursts to have a substantially Gaussian shape.

13. The method of claim 1, wherein:

step (a) further comprises adjusted a phase of said sinusoidal signal based on an information signal, and

step (b) further comprises time positioning each pulse of said train of pulses using said information signal,

thereby causing each sinusoidal burst in said train of sinusoidal bursts that is produced in step (c) to be phase and position modulated based on said information signal.

14. The method of claim 13, wherein said each pulse in said train of pulses has a substantially Gaussian shape, thereby causing each sinusoidal burst in said train of sinusoidal bursts to have a substantially Gaussian shape.

15. The method of claim 1, wherein:

step (a) further comprises adjusted a phase of said sinusoidal signal using an information signal and a coding signal, and

step (b) further comprises time positioning each pulse in said train of pulses using said information signal and said coding signal,

thereby causing each sinusoidal burst in said train of sinusoidal bursts that is produced in step (c) to be phase and position modulated based on said information signal and said coding signal.

16. The method of claim 1, wherein:

step (a) further comprises adjusted a phase of said sinusoidal signal using an information signal and a coding signal, and

step (b) further comprises time positioning each pulse of said train of pulses using one of said information signal and said coding signal,

thereby causing each sinusoidal burst in said train of sinusoidal bursts that is produced in step (c) to be phase and position modulated based on at least one of said information signal and said coding signal.

17. The method of claim 1, wherein:

step (a) further comprises adjusted a phase of said sinusoidal signal using one of an information signal and a coding signal, and

step (b) further comprises time positioning each pulse of said train of pulses using said information signal and said coding signal,

thereby causing each sinusoidal burst in said train of sinusoidal bursts that is produced in step (c) to be phase and position modulated based on at least one of said information signal and said coding signal.

18. The method of claim 1, wherein step (a) further comprises controlling a frequency of said sinusoidal signal so that said sinusoidal bursts produced in step (c) have a desired center frequency, said center frequency of said sinusoidal bursts being equal to said frequency of said sinusoidal signal.

19. The method of claim 18, wherein step (b) further comprises controlling a width of the pulses in said train of pulses so that said sinusoidal bursts produced in step (c) have a desired bandwidth, said bandwidth of said sinusoidal bursts being substantially equal to a reciprocal of said width.

20. The method of claim 1, wherein step (b) further comprises controlling a width of the pulses in said train of pulses so that said sinusoidal bursts produced in step (c) have a desired bandwidth, said bandwidth of said sinusoidal bursts being substantially equal to a reciprocal of said width.

21. A method for receiving an impulse radio signal, comprising the steps of:

(a) producing a sinusoidal signal;

(b) producing a train of pulses;

(c) multiplying said sinusoidal signal by said train of pulses to produce a template signal consisting of a train of sinusoidal bursts; and

(d) cross correlating a received impulse radio signal with said template signal to output a baseband signal.

22. A method for receiving an impulse radio signal, comprising the steps of:

(a) producing a coding signal;

(b) producing a sinusoidal signal;

(c) producing a train of pulses;

(d) time positioning each pulse of said train of pulses using said coding signal to produce a code position modulated train of pulses;

(e) multiplying said sinusoidal signal by said code position modulated train of pulses to produce a template signal consisting of a train of code position modulated sinusoidal bursts; and

(d) cross correlating a received impulse radio signal with said template signal to output a baseband signal.

23. A method for receiving an impulse radio signal, comprising the steps of:

(a) producing a coding signal;

(b) producing a sinusoidal signal;

(c) producing a train of pulses;

(d) adjusting the phase of said sinusoidal signal using said coding signal to produce a code phase modulated sinusoidal signal;

(e) multiplying said code phase modulated sinusoidal signal by said train of pulses to produce a template signal consisting of a train of code phase modulated sinusoidal bursts; and

(d) cross correlating a received impulse radio signal with said template signal to output a baseband signal.

24. A method for receiving an impulse radio signal, comprising the steps of:

(a) producing a coding signal;

(b) producing a sinusoidal signal;

(c) producing a train of pulses;

(d) adjusting the phase of said sinusoidal signal using said coding signal to produce a code phase modulated sinusoidal signal;

(e) time positioning each pulse of said train of pulses using said coding signal to produce a code position modulated train of pulses;

(f) multiplying said code phase modulated sinusoidal signal by said code position modulated train of pulses to produce a template signal consisting of a train of code phase and position modulated sinusoidal bursts; and

(d) cross correlating a received impulse radio signal with said template signal to output a baseband signal.

25. An impulse radio transmitter, comprising:

a sine generator that outputs a sinusoidal signal;

a precision timing generator that outputs a trigger signal;

a gate function generator that receives said trigger signal and outputs a train of pulses;

a multiplier that multiplies said sinusoidal signal with said train of pulses and outputs a train of sinusoidal bursts; and

an antenna to transmit said train of sinusoidal bursts.

26. The impulse radio transmitter of claim 25, wherein each pulse in said train of pulses output from said gate function generator is Gaussian shaped, thereby causing said sinusoidal bursts to be Gaussian shaped.

27. The impulse radio transmitter of claim 25, further comprising an information source that outputs an information signal.

28. The impulse radio transmitter of claim 27, wherein said precision timing generator receives said information signal and produces said trigger signal using said information signal.

29. The impulse radio transmitter of claim 27, further comprising a code generator that outputs a coding signal.

30. The impulse radio transmitter of claim 29, wherein said precision timing generator receives said information signal and said coding signal and produces said trigger signal using said information signal and said coding signal.

31. The impulse radio transmitter of claim 27, further comprising:

a precision phase adjustor that outputs a phase adjustment signal; and

a phase modulator that receives said phase adjustment signal and adjusts a phase of said sinusoidal signal using said phase adjustment signal.

32. The impulse radio transmitter of claim 31, wherein said precision phase adjustor receivers said information signal and produces said phase adjustment signal using said information signal, thereby causing said phase modulator to adjust said phase of said sinusoidal signal based on said information signal.

33. The impulse radio transmitter of claim 31, further comprising a code generator for outputting a coding signal.

34. The impulse radio transmitter of claim 31, wherein said precision phase adjustor receives said information signal and said coding signal and produces said phase adjustment signal using said information signal and said coding signal, thereby causing said phase modulator to adjust said phase of said sinusoidal signal based on said information signal and said coding signal.

35. The impulse radio transmitter of claim 25, wherein a frequency of said sinusoidal signal output from said sine generator dictates a center frequency of said transmitted train of sinusoidal bursts, said center frequency being equal to said frequency of said sinusoidal signal.

36. The impulse radio transmitter of claim 35, wherein a width of the pulses in said train of pulses output from said gate generator dictates a bandwidth of said transmitted train of sinusoidal bursts, said bandwidth being substantially equal to a reciprocal of said width.

37 An impulse radio transmitter, comprising:

a sine generator that outputs a sinusoidal signal;

a precision phase adjustor and timing generator that outputs a phase adjustment signal and a trigger signal;

a gate function generator that receives said trigger signal and outputs a train of pulses;

a phase modulator that receives said phase adjustment signal and adjusts a phase of said sinusoidal signal using said phase adjustment signal;

a multiplier that multiplies said phase adjusted sinusoidal signal with said train of pulses and outputs a train of phase adjusted sinusoidal bursts;

an antenna to transmit said train of phase adjusted sinusoidal bursts.

38. The impulse radio transmitter of claim 37, further comprising:

an information source that outputs an information signal.

39. The impulse radio transmitter of claim 38, wherein said precision phase adjustor and timing generator receives said information signal and produces said phase adjustment signal and said trigger signal using said information signal.

40. The impulse radio transmitter of claim 38, further comprising:

a code generator that outputs a coding signal.

41. The impulse radio transmitter of claim 40, wherein said precision phase adjustor and timing generator receives said information signal and said coding signal and produces said phase adjustment signal and said trigger signal using said information signal and said coding signal.

42. An impulse radio receiver, comprising:

a sine generator that outputs a sinusoidal signal;

a precision timing generator that outputs a trigger signal;

a gate function generator that receives said trigger signal and outputs a train of pulses;

a multiplier that multiplies said sinusoidal signal with said train of pulses and outputs a template signal consisting of a train of sinusoidal bursts; and

a cross correlator that cross correlates a received impulse radio signal with said template signal and outputs a baseband signal.

43. The impulse radio receiver of claim 42, further comprising a code generator that outputs a coding signal.

44. The impulse radio receiver of claim 43, wherein said precision timing generator receives said coding signal and produces said trigger signal using said coding signal.

45. An impulse radio receiver, comprising:

a sine generator that outputs a sinusoidal signal;

a precision phase adjustor and timing generator that outputs a phase adjustment signal and a trigger signal;

a gate function generator that receives said trigger signal and outputs a train of pulses;

a phase modulator that receives said phase adjustment signal and outputs a phase modulated sinusoidal signal;

a multiplier that multiplies said phase modulated sinusoidal signal with said train of pulses and outputs a template signal consisting of a train of phase modulated sinusoidal bursts; and

a cross correlator that cross correlates a received impulse radio signal with said template signal and outputs a baseband signal.

46. The impulse radio receiver of claim 45, further comprising:

a code generator that outputs a coding signal.

47. The impulse radio receiver of claim 46, wherein said precision phase adjustor and timing generator receives said coding signal and produces said phase adjustment signal and said trigger signal using said coding signal.